

REMARKS

Upon entry of the present amendment, claims 8-9, 12-13 and 16-31 will remain pending in the above-identified application with claims 8-9, 12-13 and 16-23 standing ready for further action on the merits, while claims 24-31 stand withdrawn from consideration based upon a prior Restriction Requirement.

The amendments made herein to the specification and claims do not incorporate new matter into the application as originally filed. For example, the amendments made at pages 88 and 90 of the specification simply correct a typographical error by changing "cyclohexane" to "hexane" as disclosed in Applicants' original priority document. It is only through a clerical error that this typographical error occurred in the present application, and its correction does not introduce new matter into the Application. Should the Examiner desire an appropriate translation of the pertinent portions of Applicants' Japanese priority document JP 11-370679 in order to support the changes made at pages 88 and 90, Applicants will provide a translation of these portions of the priority document when so requested by the Examiner.

Concerning the amendments to the claims, it is noted that the amendment to claims 8-9 find support in original claims 1 and 10-11. Further, regarding the amendments to claims 12-13, these find support in original claims 14-15 and/or simply change the

dependency of the claims. Regarding the amendments to claims 16-17, these amendments simply change the dependency of the claims.

Regarding the cancellation of claims 1-7, 10-11 and 14-15 herein, it is noted that these claims have been cancelled in order to avoid redundancies with remaining amended claims 8-9 and 12-13.

Restriction Requirement

The Examiner has previously required restriction between claims 1-23 (drawn to a catalyst) and claims 24-31 (drawn to a process for using a catalyst). Applicants have previously responded to the Restriction Requirement with traverse, while electing the invention of claims 1-23 for prosecution at present. Applicants traverse the Restriction Requirement, since an Examination of each of pending claims 1-31 would produce no undue burden on the Examiner. In support of this, it is noted that the catalyst recited in the first elected invention are utilized in the second non-elected invention, so that the search of the catalysts would be pertinent to an Examination of the process of the second non-elected invention.

Accordingly, the Examiner is respectfully requested to consider each of pending claims 8-9, 12-13 and 16-31 at present.

Should the Examiner not agree that examination of each of the pending claims is required at present, then he is respectfully

requested to rejoin the non-elected claims 24-31 upon indication of allowable subject matter within the elected group.

Claim Rejections Under 35 USC § 112

Claims 1-23 have been rejected under 35 USC § 112, second paragraph. Reconsideration and withdrawal of this rejection is requested based upon the following considerations.

Applicants have amended claims to remove instances which may have otherwise been deemed indefinite. For example, Applicants have amended the claims so that each of the claims only contains one period, and to remove parenthesis, which the Examiner believed to be indefinite. Regarding the term " μ -oxo type compounds" that occurs in claims 8-9, this language still occurs in the pending claims, since it is not indefinite and at the same time finds good support in Applicants' specification at page 22, lines 21-22, and at page 72, line 12 to page 75, line 9, wherein a large listing of μ -oxo type compounds is provided.

For the Examiner's convenience, it is also noted that the term " μ -oxo type compound" is a generic name of compounds in which two M^1 's in $L_a M^1 X_b(\text{compound}(B))$ of the two are mutually bridged through one oxygen atom. For example, μ -oxo type compounds are disclosed in US Patent 6,242,622 B1, and as mentioned above concrete examples of μ -oxo type compounds are described in the present specification at pages 72-75. As such, the term " μ -oxo type compound" as used in

the present specification is fully acceptable under the provisions of 35 USC § 112, second paragraph.

Claim Rejections Under 35 USC § 102

Claims 1-23 have been rejected under 35 USC § 102(b) as being anticipated by EP 0 683 184 A1 (EP '184). Further, claims 1-7 have been rejected under 35 USC § 102(b) as being anticipated by EP 0 510 602 A1 (EP '602). Still further, claims 1-3 and 7 have been rejected under 35 USC § 102(b) as being anticipated by Inoue '013 or Bremner '455 or Smirnov '944. Reconsideration and withdrawal of each of these rejections is respectfully requested based upon the following considerations.

As to the outstanding rejections of claims 1-7, these claims have been cancelled in the present amendment. As a result, the rejections over EP '602, Inoue '013, Bremner '455 and Smirnov '944 have been rendered moot.

Concerning the rejection over EP '184, the following is specifically noted as it pertains to pending claims 8-9, 12-13 and 16-23.

EP '184 discloses $([L^2]^{k+})_p (M^6 Z^1 Z^2 \dots Z^n)^{(h-g)^-}_q$ (XVI), and when L^2 is $R^{21}M^8$, R^{21} is tetraphenylporphyrin or phthalocyanine and M^8 is an element selected from the groups 3,4,5,6,7,8-10,1,11,2,12 and 17.

Namely, neither tetraphenylporphyrin nor phthalocyanine is substituted with an electron-withdrawing group.

On the other hand, it is recited in the claimed invention to use a porphyrin or phthalocyanine substituted with an electron-withdrawing group (e.g., see claims 8-9).

Therefore, the instantly claimed invention is not anticipated by the EP '184 cited reference.

Claim Rejections Under 35 USC § 103

Claims 1 and 8-21 have been rejected under 35 USC § 103(a) as being unpatentable over EP 0 683 184 A1 (EP '184) in view of EP 0 510 602 A1 (EP '602). Reconsideration and withdrawal of this rejection is respectfully requested based upon the following considerations.

EP '602 teaches metal porphyrin complex in which porphyrin ring may be substituted with an electron-withdrawing group. Further, EP '602 discloses that the metal porphyrin complex as a polymerization initiator and an organoaluminum compound having a bulky substituent group as a cocatalyst are used for living polymerization of a (meth)acrylic acid ester, an epoxide or a lactone. (Meth)acrylic acid ester, an epoxide and a lactone belong to polar monomers. (Herein-after, (meth)acrylic acid ester, an epoxide and a lactone are referred to as "polar monomer").

Moreover, as the porphyrin complex disclosed in EP '602 is a polymerization initiator, the polymerization of the polar monomer by using only the porphyrin complex is possible as shown in Comparative Examples 1, 3 and 4 of the Table 1 on page 14.

Furthermore, the organoaluminum compound as the cocatalyst is an aluminoxane as represented by the formulas (I) and (II) (page 16), and this aluminoxane corresponds to the component (B-2) in EP '184.

Moreover, EP '602 is silent regarding use of metallocene transition metal compound used in EP '184 as an essential and main component (component (A)).

On the other hand, EP '184 teaches catalysts for polymerization of ethylene or copolymerization of ethylene with a C₃₋₂₀ α -olefin, cyclic olefin, styrene or styrene derivative, which is a non-polar monomer, but fails to teach or suggest any polymerization catalyst of polar monomers.

Further, the polymerization catalyst disclosed in EP '184 (on page 24, line 55 to page 28, line 5) is as follows:

Component (A):

A specific transition metal compound,

Component (B):

(B-1) An ionic compound for reacting with the transition metal compound of the component (A) to form an ionic complex,

(B-2) an aluminoxane or

(B-3) a Lewis acid, and optionally

Component (C):

Organoaluminum compound.

Among these, in the component (B-1), a compound having tetraphenylporphyrin or phthalocyanine is described (on page 25, line 15-30).

The Examiner stated,

"At the time...it would have been obvious to a person of ordinary skill in the art to take the catalyst composition as taught by EP '184, including the compound with the porphyrin group, and use the porphyrin complex as taught by EP '602, using the suggested metals besides aluminum. One of ordinary skill in the art would have been motivated to do this because EP '602 teaches these porphyrin compounds act as polymerization initiators in the living polymerization of monomers."

However, the component (B-1) disclosed in EP '184 is an ionic compound for reacting with the transition metal compound of the component (A) to form an ionic complex, therefore, the component (A) in EP '184 is essential.

On the other hand, as mentioned above, it is clear that

(1) the transition metal compound corresponding to the component (A) used as the essential component in EP '184, is silent in EP '602,

(2) the catalyst in EP'602 is composed of the porphyrin complex and the aluminoxane (having a bulky substituent group) corresponding to the component (B-2) in EP '184, and

(3) the monomer to be polymerized is different between EP '184 and EP '602.

Therefore, it is also clear that functions of the catalyst itself and the porphyrin compound in the catalyst are quite different between EP '184 and EP '602, and that a person of ordinary skill in the art would not be motivated to use the porphyrin compound disclosed in EP '602 instead of the component (B-1) in EP '184.

Further, the Applicants submit herewith a Declaration under 37 CFR § 1.132 of Kazuo Takaoki to exhibit a difference between a cobalt complex of phthalocyanine and that of a fluorine-substituted phthalocyanine. It is clear from the Declaration that completely different results were obtained with the two different complexes, which could not be expected by a person of ordinary skill in the art. Such results serve as an indication of the patentability of the instant invention.

In conclusion, the amended claims are not obvious to a person of ordinary skill in the art from EP '184 in view of EP '602, are therefore patentable under the provisions of 35 USC § 103.

Provisional Request for Interview

Should the present response not place this application in condition for allowance, the Examiner is respectfully requested to contact the undersigned so that a personal interview may be

scheduled at the Examiner's earliest convenience in order to expedite the present application's prosecution towards allowance.

CONCLUSION

Based upon the amendments and remarks presented herein, the Examiner is respectfully requested to issue a Notice of Allowance clearly indicating that each of Applicants' pending claims under consideration (claims 8-9, 12-13 and 16-23) are allowed and patentable under the provisions of Title 35 of the United States Code. Further, the Examiner is also requested to rejoin non-elected claims 24-31 and to issue a Notice of Allowance clearly indicating that each of these claims are also patentable under the provisions of Title 35 of the United States Code.

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact John W. Bailey (Reg. No. 32,881) at the telephone number below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

Attached hereto is a marked-up version of the changes made to the application by this Amendment.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees

required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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By 

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Attachment: Version with Markings to Show Changes Made
US Patent 6,242,622 B1
37 CFR § 1.132 Declaration of Kazuo Takaoki

(Rev. 02/20/02)

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The paragraph beginning on page 88, line 24, has been amended as follows:

After drying under vacuum an autoclave having an inner volume of 400ml equipped with a stirrer and replacing with argon, 190ml of [cyclohexane] hexane as a solvent and 10ml of 1-hexene as a comonomer were charged and the autoclave was heated to 70°C. After the heating, ethylene was fed while adjusting at an ethylene pressure of 6kg/cm². After the system was stabilized, 0.25mmol of triisobutylaluminum was charged, successively, 1.0μmol of ethylenebis(indenyl)zirconium dichloride was charged, further, 86.5mg (101μmol) of the complex A having the under-mentioned structure was charged, and polymerization was started. The polymerization was carried out for 30 minutes.

The paragraph beginning on page 90, line 11, has been amended as follows:

After drying under vacuum an autoclave having an inner volume of 400ml equipped with a stirrer and replacing with argon, 190ml of [cyclohexane] hexane as a solvent and 10ml of hexene-1 as a comonomer were charged and the reactor was heated to 70°C. After

the heating, ethylene was fed while adjusting at an ethylene pressure of 6kg/cm². After the inside of system was stabilized, 0.25mmol of triisobutylaluminum was charged, and successively, 77.1mg (89.7 μ mol) of the complex A used in Example 1 was charged. After stirring for 30 minutes, 1.0 μ mol of ethylenebis(indenyl)zirconium dichloride was charged, and polymerization was carried out for 30 minutes.

IN THE CLAIMS:

Claims 1-7, 10-11 and 14-15 have been canceled.

The claims have been amended as follows:

8. (Amended) A catalyst for addition polymerization obtained by contacting [the compound (A) of claim 1] (A) a compound containing an atom of the Group II to the Group XII or Lanthanide series of the Periodic Table of the Elements, in which the lowest energy level of unoccupied molecular orbital having the valence p-type atomic orbital of the atom of the Group II to the Group XII or Lanthanide series as a main component wherein the coefficient represented by a linear combination is 0.4 or more is calculated to be 0.008 atomic unit (Hartree) or less by the calculation of density functional method (B3LYP/3-21G level) and wherein the compound (A) is a porphyrin or phthalocyanine complex in which a metal atom of the Group II to the Group XII is coordinated, a metal

compound (B) selected from the group consisting of compounds represented by the general formula [4]:



[()wherein M^1 is a metal atom of the Group III to the Group XIII or Lanthanide series; L is a group having cyclopentadienyl type anion skeleton or a group containing a hetero atom, a plurality of L's may be linked directly, or through a residual group containing a carbon atom, a silicon atom, a nitrogen atom, an oxygen atom, a sulfur atom or a phosphorous atom; X is a halogen atom or a hydrocarbon group; "a" represents a number satisfying $0 < a \leq 8$; and "b" represents a number satisfying $0 < b \leq 8$ [.)] and μ -oxo type compounds thereof.

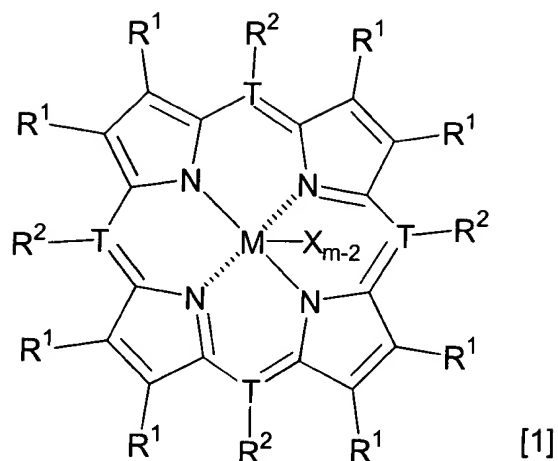
9. (Amended) A catalyst for addition polymerization obtained by contacting [the compound (A) of claim 1] (A) a compound containing an atom of the Group II to the Group XII or Lanthanide series of the Periodic Table of the Elements, in which the lowest energy level of unoccupied molecular orbital having the valence p-type atomic orbital of the atom of the Group II to the Group XII or Lanthanide series as a main component wherein the coefficient represented by a linear combination is 0.4 or more is calculated to be 0.008 atomic unit (Hartree) or less by the calculation of density functional method (B3LYP/3-21G level) and wherein the

compound (A) is a porphyrin or phthalocyanine complex in which a metal atom of the Group II to the Group XII is coordinated, a metal compound (B) selected from the group consisting of compounds represented by the general formula [4]:



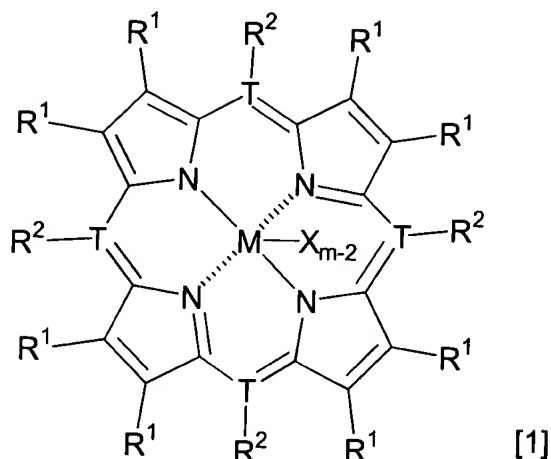
[] wherein M^1 is a metal atom of the Group III to the Group XIII or Lanthanide series; L is a group having cyclopentadienyl type anion skeleton or a group containing a hetero atom, a plurality of L's may be linked directly, or through a residual group containing a carbon atom, a silicon atom, a nitrogen atom, an oxygen atom, a sulfur atom or a phosphorous atom; X is a halogen atom or a hydrocarbon group; "a" represents a number satisfying $0 < a \leq 8$; and "b" represents a number satisfying $0 < b \leq 8$ [.] ; and μ -oxo type compounds thereof, and an organoaluminum compound (C).

12. (Amended) The catalyst according to claim [10] 8, the compound (A) is a compound represented by the general formula [1]:



[1] wherein M represents an atom of the Group II to the Group XII or Lanthanide series of the Periodic Table, T represents an atom of the Group XIV or Group XV of the Periodic Table, and all of T's may be mutually the same or different. Each each of R¹ and R² independently is a hydrogen atom, a halogen atom, a hydrocarbon group or a halogenated hydrocarbon group, all of R¹'s and all of R²'s may be mutually the same or different, and may mutually form a ring. provided that at least one of R¹ and R² in the general formula [1] is an electron withdrawing group; X represents a hydrogen atom, a halogen atom, a hydrocarbon group or a hydrocarbon oxy group, and when a plural number of X's exist, they may be mutually the same or different. m represents a valence of M.

13. (Amended) The catalyst according to claim [11] 9, the compound (A) is a compound represented by the general formula [1]:

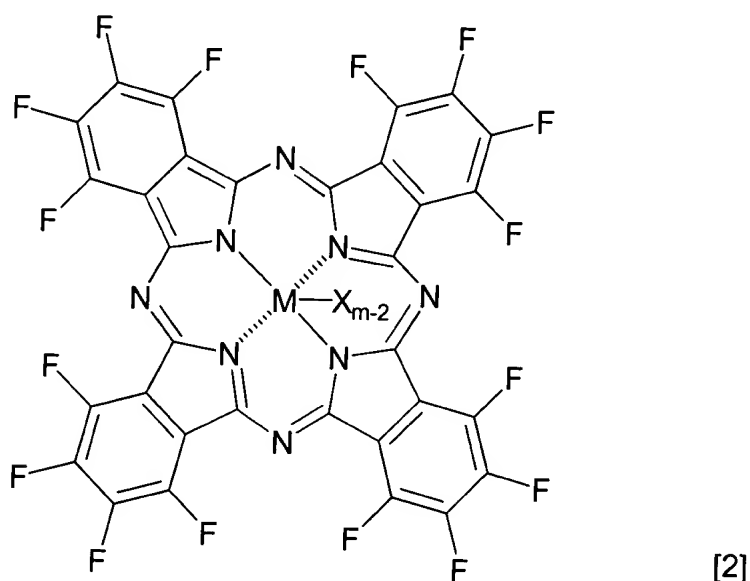


[(]wherein M represents an atom of the Group II to the Group XII or Lanthanide series of the Periodic Table, T represents an atom of the Group XIV or Group XV of the Periodic Table, and all of T's may be mutually the same or different[. Each], each of R¹ and R² independently is a hydrogen atom, a halogen atom, a hydrocarbon group or a halogenated hydrocarbon group, all of R¹'s and all of R²'s may be mutually the same or different, and may mutually form a ring[.], provided that at least one of R¹ and R² in the general formula [1] is an electron withdrawing group; X represents a hydrogen atom, a halogen atom, a hydrocarbon group or a hydrocarbon oxy group, and when a plural number of X's exist, they may be mutually the same or different[.], m represents a valence of M.[)]

16. (Amended) The catalyst according to Claim [14] 12, wherein the electron-withdrawing group is a fluorine, chlorine or bromine atom.

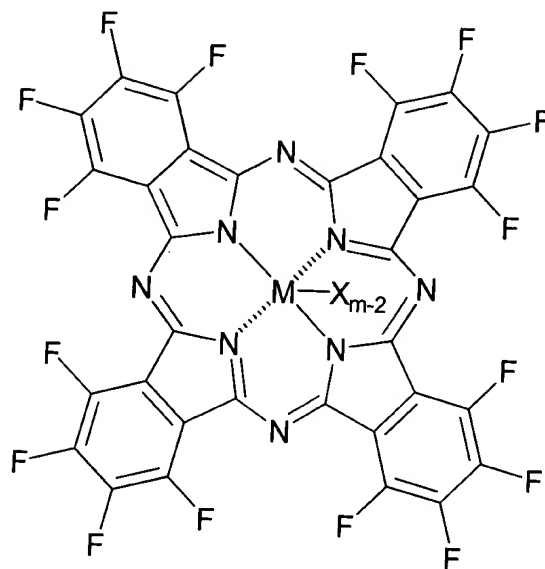
17. (Amended) The catalyst according to Claim [15] 13, wherein the electron-withdrawing group is a fluorine, chlorine or bromine atom.

18. (Amended) The catalyst according to Claim 16, wherein the compound is a compound represented by the general formula [2]:



[()wherein M represents an atom of the Group II to the Group XII excluding Cu or Lanthanide series of the Periodic Table, X represents a hydrogen atom, a halogen atom, a hydrocarbon group or a hydrocarbon oxy group, and when a plural number of X's exist, they may be mutually the same or different[.], m represents a valence of M.[)]

19. (Amended) The catalyst according to Claim 17, wherein the compound is a compound represented by the general formula [2]:



[2]

[()wherein M represents an atom of the Group II to the Group XII excluding Cu or Lanthanide series of the Periodic Table, X represents a hydrogen atom, a halogen atom, a hydrocarbon group or a hydrocarbon oxy group, and when a plural number of X's exist, they may be mutually the same or different[.], m represents a valence of M[.))].